REMARKS

1. Claims 1-40 are pending.

The applicant hereby cancels claims 2, 12, 22 and 32.

The applicant hereby amends claims 1, 3-11, 13-21, 23-31 and 33-40. All amendments are supported by the originally-filed application including, but not limited to, the written description from page 34, line 10 to page 35, line 6; page 35, lines 21-22 and 26-27; from page 35, line 28 to page 36, line 2; from page 36, line 7 to page 37, line 13; page 38, lines 6-8 and 13-14; from page 13, line 22 to page 14, line 7; and page 14, lines 8-25.

2. The applicant hereby presents four (4) new claims numbered 41-44. These claims are supported by the originally-filed application including, but not limited to, the drawing view designated FIG. 49, together with the portions of the written description corresponding thereto. This is explained below.

Referring to FIG. 49 and, in particular, to the beam array 1009 and the coupling beam 1005 depicted therein, the coupling beam 1005 is clearly depicted as intersecting only a portion of the beam segment 1022 in each beam of the corresponding plurality of beams 1010a, 1010b, 1010c which comprise the beam array 1009.

3. The remarks below are directed to the remaining claims 1, 3-11, 13-21, 23-31 and 33-44.

4. Claims 1 and 11 were rejected under section 102 as being anticipated by Howell et al., U.S. Pat. No. 6,734,597 B1 ("Howell"). In response, these claims been amended to more clearly and more patentably distinguish the claimed invention over Howell. As a result, and for the reasons discussed below, it is believed this rejection is traversed.

Based on M.P.E.P. section 706.02, "for anticipation under 35 U.S.C. 102, the reference (Howell) must teach every aspect of the claimed invention either explicitly or impliedly. Any feature not directly taught must be inherently present".

In contrast, however, when these claims 1 and 11 are compared to Howell, substantial differences become apparent. This is explained below.

5. As to the rejection of claim 1 under section 102, this claim is copied below:

> *A thermal actuator (900) comprising:*
> *a substrate having a surface;*
> *a first support and a second support disposed on the surface and extending orthogonally therefrom;*
> *a beam (910) extending between the first support and the second support, the beam having a first side (911), a second side (912), a beam length (918) and a beam mid-point (919), the beam being substantially straight along the first side (911);*
> *the beam comprised of a plurality of **beam segments** (920, 921, 922, 923, 924), each **beam segment** of the plurality of **beam segments** having a **beam segment neutral axis** (913, 914, 915, 916, 917), the beam thus forming a corresponding plurality of **beam segment neutral axes**;*
> *wherein the plurality of **beam segment neutral axes** corresponding to the beam vary along the beam length based on a predetermined pattern;*
> *so that a heating of the beam causes a beam buckling and the beam mid-point to translate in a predetermined direction (948) generally normal to and outward from the second side;*
> *wherein the predetermined pattern is characterized in that, along the beam length from the first support to the beam mid-point, **beam segment neutral axes** corresponding to successive **beam segments** are not offset towards the first side and at least sometimes are offset towards the second side, and along the beam length from the beam mid-point to the second support, **beam segment neutral axes** corresponding to successive **beam segments** are not offset towards the second side and at least sometimes are offset towards the first side,*
>
> claim 1, emphasis added.

As shown by the **emphasized text** above, claim 1 includes a first limitation, namely, "**beam segment**" or "**beam segments**", for a combined total of five (5) occurrences. Also, claim 1 includes a second limitation, namely, "**beam segment neutral axis**" or "**beam segment neutral axes**", for a total of five (5) occurrences.

Thus, although claim 1 expressly includes the first limitation ("**beam segment**" or "**beam segments**") and the second limitation ("**beam segment neutral axis**" or "**beam**

segment neutral axes") for a combined total of ten (10) occurrences, in contrast, Howell's text DOES NOT CONTAIN ANY of these first and second limitations.

Hence, Howell does NOT "teach every aspect of the claimed invention" in claim 1, as required by M.P.E.P. §706.02 to support the rejection of anticipation. This rejection thus is traversed and claim 1 is allowable.

6. Moreover, claim 1 is further believed allowable over Howell for the further reasons given in 6A-6F below.

Claim 1 again is copied below:

> *A thermal actuator (900) comprising:*
> *a substrate having a surface;*
> *a first support and a second support disposed on the surface and extending orthogonally therefrom;*
> *a beam (910) extending between the first support and the second support, the beam having a first side (911), a second side (912), a beam length (918) and a beam mid-point (919), the beam being substantially straight along the first side (911);*
> *the beam comprised of a plurality of beam segments (920, 921, 922, 923, 924), each beam segment of the plurality of beam segments having a beam segment neutral axis (913, 914, 915, 916, 917), the beam thus forming a corresponding plurality of beam segment neutral axes;*
> *wherein the plurality of beam segment neutral axes corresponding to the beam vary along the beam length based on a predetermined pattern;*
> *so that a heating of the beam causes a beam buckling and the beam mid-point to translate in a predetermined direction (948) generally normal to and outward from the second side;*
> *wherein the predetermined pattern is characterized in that, along the beam length from the first support to the beam mid-point, beam segment neutral axes corresponding to successive beam segments are not offset towards the first side and at least sometimes are offset towards the second side, and along the beam length from the beam mid-point to the second support, beam segment neutral axes corresponding to successive beam segments are not offset towards the second side and at least sometimes are offset towards the first side,*
>
> claim 1, emphasis added.

As discussed above, in order for Howell to anticipate claim 1 under M.P.E.P. §706.02, Howell must satisfy every limitation in claim 1. However, as explained in 6A-

6F below, when claim 1 is compared to Howell, further differences become apparent. Claim 1 thus is further allowable over Howell based on these further differences.

6A. In one embodiment, Howell's Figures 1-2 depict a plurality of beams 20 and 22, wherein each beam of the plurality of beams 20 and 22 comprises a uniform width and is substantially straight. Based on these "uniform width" and "substantially straight" beam features, Howell's Figures 1 and 2-depicted plurality of beams 20 and 22 thus DO NOT SATISFY ANY of the following two (2) further limitations of claim 1:

> *"wherein the plurality of beam segment neutral axes corresponding to the beam vary along the beam length based on a predetermined pattern",*
>
> claim 1, emphasis added (the "third limitation");

and

> *"wherein the predetermined pattern is characterized in that, along the beam length from the first support to the beam mid-point, beam segment neutral axes corresponding to successive beam segments are not offset towards the first side and at least sometimes are offset towards the second side, and along the beam length from the beam mid-point to the second support, beam segment neutral axes corresponding to successive beam segments are not offset towards the second side and at least sometimes are offset towards the first side",*
>
> claim 1, emphasis added (the "fourth limitation").

6B. In a further embodiment, Howell's Figure 3 depicts a plurality of substantially straight, uniform-width beams 20. Based on these beam features of "substantially straight" and "uniform width", Howell's Figure 3-depicted plurality of beams 20 DO NOT SATISFY ANY of the third and fourth limitations of claim 1 as discussed in 6A above.

6C. In another embodiment, Howell's Figure 4 depicts three (3) beams, with each beam comprising a first beam end element 49, a center beam element 48 and a

second beam end element 49. As depicted, the following characterizations I and II apply to each beam's center beam element 48 with respect to its adjacent first and second end beam elements 49:

I. The center beam element is WIDER than the end beam elements 49;

and

II. The center beam element 48's upper and lower longitudinal edges are NON-CO-LINEAR, DISCONTINUOUS and NOT ALIGNED with any of the corresponding upper and lower longitudinal edges of the end beam elements 49.

Based on these characterizations I and II above, Howell's Figure 4-depicted three (3) beams DO NOT SATISFY the limitation *"the beam being substantially straight along the first side (911)"* of claim 1, emphasis added.

6D. In a still further embodiment, Howell's Figure 5 depicts a first plurality of substantially straight, uniform-width beams 20 and a second plurality of straight, uniform-width beams 22. Based on these beam features of "substantially straight" and "uniform width", Howell's Figure 5-depicted first and second pluralities of beams 20 and 22 DO NOT SATISFY ANY of the third and fourth limitations of claim 1 as discussed in 6A above.

6E. In still another embodiment, Howell's Figure 6 depicts a first plurality of substantially straight, uniform-width beams 67a; a second plurality of substantially straight, uniform-width beams 68a; a third plurality of substantially straight, uniform-width beams 67b; a fourth plurality of substantially straight, uniform-width beams 68b; a fifth plurality of substantially straight, uniform-width beams 72a; and a sixth plurality of substantially straight, uniform-width beams 72b. Based on these beam features of "substantially straight" and "uniform width", Howell's Figure 6-depicted first, second, third, fourth, fifth and sixth pluralities of beams 67a, 68a, 67b, 68b, 72a and 72b DO NOT SATISFY ANY of the third and fourth limitations of claim 1 as discussed in 6A above.

6F. In a yet still further embodiment, Howell's Figure 7 depicts a first plurality of substantially straight, uniform-width beams 86a; a second plurality of substantially straight, uniform-width beams 86b; a third plurality of substantially straight, uniform-width beams 91a; a fourth plurality of substantially straight, uniform-width beams 91b; a fifth plurality of substantially straight, uniform-width beams 94a; and a sixth plurality of substantially straight, uniform-width beams 94b. Based on these beam features of "substantially straight" and "uniform width", Howell's Figure 7-depicted first, second, third, fourth, fifth and sixth pluralities of beams 86a, 86b, 91a, 91b, 94a and 94b DO NOT SATISFY ANY of the third and fourth limitations of claim 1 as discussed in 6A above.

In summary, for the reasons explained in 5 and 6A-6F above, Howell does NOT "teach every aspect of the claimed invention" in claim 1, as required to support the rejection of anticipation. This rejection thus is traversed and claim 1 is allowable.

7. As for dependent claims 3-10, these claims are allowable as depending on their common parent claim 1 which, as explained in 5-6 above, is itself allowable.

8. As to the rejection of claim 11 under section 102, this claim is copied below:

A thermal actuator (1000) comprising:
a substrate having a surface;
a first support and a second support disposed on the surface and extending orthogonally therefrom;
a plurality of beams (1010a, 1010b, 1010c) extending in parallel between the first support and the second support, thus forming a beam array (1009);
each beam of the beam array having a first side (1011a, 1011b, 1011c), a second side (1012a, 1012b, 1012c), a beam length (1018) and a beam mid-point (1019), each beam being substantially straight along its first side (1011a, 1011b, 1011c);
*each beam of the beam array comprised of a plurality of **beam segments** (1020, 1021, 1022, 1023, 1024), each **beam segment** of the plurality of **beam segments** having a **beam segment neutral axis** (1013a, 1014a, 1015a, 1016a, 1017a; 1013b, 1014b, 1015b, 1016b, 1017b; 1013c, 1014c, 1015c, 1016c, 1017c), each beam thus forming a corresponding plurality of **beam segment neutral axes**;*

*wherein the plurality of **beam segment neutral axes** corresponding to each beam vary along the beam length based on a predetermined pattern;*

an included coupling beam (1005) extending orthogonally across the beam array to couple each beam of the beam array substantially at the corresponding beam mid-point;

so that a heating of the beam array causes a beam array buckling and the coupling beam to translate in a predetermined direction (1048) generally normal to and outward from the second sides of the array beams;

*wherein the predetermined pattern is characterized in that, along the beam length from the first support to the beam mid-point, **beam segment neutral axes** corresponding to successive **beam segments** are not offset towards the first side and at least sometimes are offset towards the second side, and along the beam length from the beam mid-point to the second support, **beam segment neutral axes** corresponding to successive **beam segments** are not offset towards the second side and at least sometimes are offset towards the first side,*

claim 11, emphasis added.

As shown by the **emphasized text** above, claim 11 includes a first limitation, namely, "**beam segment**" or "**beam segments**", for a combined total of five (5) occurrences. Also, claim 11 includes a second limitation, namely, "**beam segment neutral axis**" or "**beam segment neutral axes**", for a total of five (5) occurrences.

Thus, although claim 11 expressly includes the first limitation ("**beam segment**" or "**beam segments**") and the second limitation ("**beam segment neutral axis**" or "**beam segment neutral axes**") for a combined total of ten (10) occurrences, in contrast, Howell's text DOES NOT CONTAIN ANY of these first and second limitations.

Hence, Howell does NOT "teach every aspect of the claimed invention" in claim 11, as required by M.P.E.P. §706.02 to support the rejection of anticipation. This rejection thus is traversed and claim 11 is allowable.

9. Moreover, claim 11 is further believed allowable over Howell for the further reasons given in 9A-9F below.

Claim 11 again is copied below:

A thermal actuator (1000) comprising:

a substrate having a surface;

a first support and a second support disposed on the surface and extending orthogonally therefrom;

a plurality of beams (1010a, 1010b, 1010c) extending in parallel between the first support and the second support, thus forming a beam array (1009);

each beam of the beam array having a first side (1011a, 1011b, 1011c), a second side (1012a, 1012b, 1012c), a beam length (1018) and a beam mid-point (1019), each beam being substantially straight along its first side (1011a, 1011b, 1011c);

each beam of the beam array comprised of a plurality of beam segments (1020, 1021, 1022, 1023, 1024), each beam segment of the plurality of beam segments having a beam segment neutral axis (1013a, 1014a, 1015a, 1016a, 1017a; 1013b, 1014b, 1015b, 1016b, 1017b; 1013c, 1014c, 1015c, 1016c, 1017c), each beam thus forming a corresponding plurality of beam segment neutral axes;

wherein the plurality of beam segment neutral axes corresponding to each beam vary along the beam length based on a predetermined pattern;

an included coupling beam (1005) extending orthogonally across the beam array to couple each beam of the beam array substantially at the corresponding beam mid-point;

so that a heating of the beam array causes a beam array buckling and the coupling beam to translate in a predetermined direction (1048) generally normal to and outward from the second sides of the array beams;

wherein the predetermined pattern is characterized in that, along the beam length from the first support to the beam mid-point, beam segment neutral axes corresponding to successive beam segments are not offset towards the first side and at least sometimes are offset towards the second side, and along the beam length from the beam mid-point to the second support, beam segment neutral axes corresponding to successive beam segments are not offset towards the second side and at least sometimes are offset towards the first side,

claim 11, emphasis added.

As discussed above, in order for Howell to anticipate claim 11 under M.P.E.P. §706.02, Howell must satisfy every limitation in claim 11. However, as explained in 9A-9F below, when claim 11 is compared to Howell, further differences become apparent. Claim 11 thus is further allowable over Howell based on these further differences.

9A. In one embodiment, Howell's Figures 1-2 depict a plurality of beams 20 and 22, wherein each beam of the plurality of beams 20 and 22 comprises a uniform width and is substantially straight. Based on these "uniform width" and "substantially

straight" beam features, Howell's Figures 1 and 2-depicted plurality of beams 20 and 22 thus DO NOT SATISFY ANY of the following two (2) further limitations of claim 11:

> *"wherein the plurality of beam segment neutral axes corresponding to each beam vary along the beam length based on a predetermined pattern",*
> claim 11, emphasis added (the "third limitation");

and

> *"wherein the predetermined pattern is characterized in that, along the beam length from the first support to the beam mid-point, beam segment neutral axes corresponding to successive beam segments are not offset towards the first side and at least sometimes are offset towards the second side, and along the beam length from the beam mid-point to the second support, beam segment neutral axes corresponding to successive beam segments are not offset towards the second side and at least sometimes are offset towards the first side",*
> claim 11, emphasis added (the "fourth limitation").

9B. In a further embodiment, Howell's Figure 3 depicts a plurality of substantially straight, uniform-width beams 20. Based on these beam features of "substantially straight" and "uniform width", Howell's Figure 3-depicted plurality of beams 20 DO NOT SATISFY ANY of the third and fourth limitations of claim 11 as discussed in 9A above.

9C. In another embodiment, Howell's Figure 4 depicts three (3) beams, with each beam comprising a first beam end element 49, a center beam element 48 and a second beam end element 49. As depicted, the following characterizations I and II apply to each beam's center beam element 48 with respect to its adjacent first and second end beam elements 49:

I. The center beam element is WIDER than the end beam elements 49;

and

II. The center beam element 48's upper and lower longitudinal edges are NON-CO-LINEAR, DISCONTINUOUS and NOT ALIGNED with any of the corresponding upper and lower longitudinal edges of the end beam elements 49.

Based on these characterizations I and II above, Howell's Figure 4-depicted three (3) beams DO NOT SATISFY the limitation *"each beam being substantially straight along its first side (1011a, 1011b, 1011c)"* of claim 11, emphasis added.

9D. In a still further embodiment, Howell's Figure 5 depicts a first plurality of substantially straight, uniform-width beams 20 and a second plurality of straight, uniform-width beams 22. Based on these beam features of "substantially straight" and "uniform width", Howell's Figure 5-depicted first and second pluralities of beams 20 and 22 DO NOT SATISFY ANY of the third and fourth limitations of claim 11 as discussed in 9A above.

9E. In still another embodiment, Howell's Figure 6 depicts a first plurality of substantially straight, uniform-width beams 67a; a second plurality of substantially straight, uniform-width beams 68a; a third plurality of substantially straight, uniform-width beams 67b; a fourth plurality of substantially straight, uniform-width beams 68b; a fifth plurality of substantially straight, uniform-width beams 72a; and a sixth plurality of substantially straight, uniform-width beams 72b. Based on these beam features of "substantially straight" and "uniform width", Howell's Figure 6-depicted first, second, third, fourth, fifth and sixth pluralities of beams 67a, 68a, 67b, 68b, 72a and 72b DO NOT SATISFY ANY of the third and fourth limitations of claim 11 as discussed in 9A above.

9F. In a yet still further embodiment, Howell's Figure 7 depicts a first plurality of substantially straight, uniform-width beams 86a; a second plurality of substantially straight, uniform-width beams 86b; a third plurality of substantially straight, uniform-width beams 91a; a fourth plurality of substantially straight, uniform-width beams 91b; a fifth plurality of substantially straight, uniform-width beams 94a; and a sixth plurality of substantially straight, uniform-width beams 94b. Based on these beam features of

"substantially straight" and "uniform width", Howell's Figure 7-depicted first, second, third, fourth, fifth and sixth pluralities of beams 86a, 86b, 91a, 91b, 94a and 94b DO NOT SATISFY ANY of the third and fourth limitations of claim 11 as discussed in 9A above.

In summary, for the reasons explained in 8 and 9A-9F above, Howell does NOT "teach every aspect of the claimed invention" in claim 11, as required to support the rejection of anticipation. This rejection thus is traversed and claim 11 is allowable.

10. As for dependent claims 13-20, these claims are allowable as depending on their common parent claim 11 which, as explained in 8-9 above, is itself allowable.

11. Claims 21 and 31 were rejected under section 103 as being unpatentable over the combination of Howell; Maluf et al., US 2002/0174891 A1 ("Maluf"); and Cochran, US Pat. No. 6,853,765 B1. In response, these claims have been amended to more clearly and more patentably distinguish the claimed invention over these references. As a result, and for the reasons discussed in 12 and 14 below, it is believed this rejection is traversed.

12. As for claim 21, this claim includes the same limitations as claim 1. As to claim 1, this claim is allowable under section 102 over Howell. This is because Howell does not satisfy those limitations of claim 1 that are identified and discussed in 5-6 above, such limitations hereinafter being referred to as "**Howell's Unsatisfied Claim 1 Limitations**".

As to claim 21, while this claim is not rejected under section 102 over Howell, claim 21 yet is allowable under section 102 over Howell. This is because Howell does not satisfy the same limitations in claim 21 that are identified and discussed above with respect to claim 1, namely, "**Howell's Unsatisfied Claim 1 Limitations**".

Moreover, claim 21 also is allowable under section 103 over the combination of Howell, Maluf and Cochran. This is because the combination of these three (3) references still does not satisfy the same limitations in claim 21 that are identified and

discussed above with respect to claim 1, namely, "**Howell's Unsatisfied Claim 1 Limitations**".

Thus, when the invention of claim 21 is compared with the references Howell, Maluf and Cochran, distinct differences become apparent. But unless these three (3) references, by themselves, would have suggested not only these differences but the entire invention of claim 21, viewed as a whole, to one of ordinary skill in the art at the time the invention was made, the invention of claim 21 is not unpatentable under section 103. This rejection thus is traversed and claim 21 is allowable.

13. As for dependent claims 23-30, these claims are allowable as depending on their common parent claim 21 which, as explained in 12 above, is itself allowable.

14. As for claim 31, this claim includes the same limitations as claim 11. As to claim 11, this claim is allowable under section 102 over Howell. This is because Howell does not satisfy those limitations of claim 11 that are identified and discussed in 8-9 above, such limitations hereinafter being referred to as "**Howell's Unsatisfied Claim 11 Limitations**".

As to claim 31, while this claim is not rejected under section 102 over Howell, claim 31 yet is allowable under section 102 over Howell. This is because Howell does not satisfy the same limitations in claim 31 that are identified and discussed above with respect to claim 11, namely, "**Howell's Unsatisfied Claim 11 Limitations**".

Moreover, claim 31 also is allowable under section 103 over the combination of Howell, Maluf and Cochran. This is because the combination of these three (3) references still does not satisfy the same limitations in claim 31 that are identified and discussed above with respect to claim 11, namely, "**Howell's Unsatisfied Claim 11 Limitations**".

Thus, when the invention of claim 31 is compared with the references Howell, Maluf and Cochran, distinct differences become apparent. But unless these three (3) references, by themselves, would have suggested not only these differences but the entire invention of claim 31, viewed as a whole, to one of ordinary skill in the art at the

time the invention was made, the invention of claim 31 is not unpatentable under section 103. This rejection thus is traversed and claim 31 is allowable.

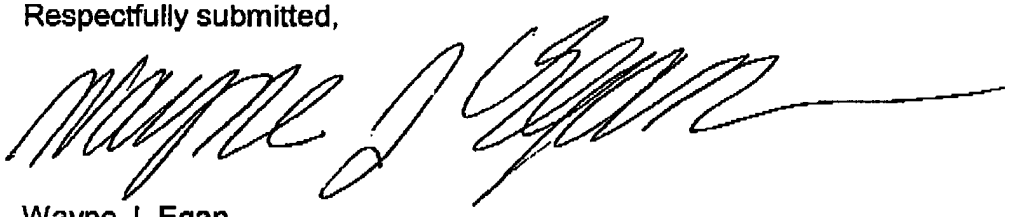
15. As for dependent claims 33-40, these claims are allowable as depending on their common parent claim 31 which, as explained in 14 above, is itself allowable.

16. The newly-added dependent claims 41-42 are allowable as depending on their common parent claim 11 which, as explained in 8-9 above, is itself allowable.

17. The newly-added dependent claims 43-44 are allowable as depending on their common parent claim 31 which, as explained in 14 above, is itself allowable.

In summary, it is believed the remaining claims are allowable and the application is in condition for allowance. Further consideration of this application is respectfully requested. Any inquiry concerning this communication should be directed to the undersigned attorney at the phone numbers shown below.

Respectfully submitted,



Wayne J. Egan
Registration No. 33,168
Xerox Corporation
100 Clinton Avenue South
Xerox Square 20A
Rochester, New York 14644
Voice Phone: 585-423-4426
Fax Phone: 585-423-5240